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DESIGNATED/ELECTED OFFICE (DO/EO/US)
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0475-0192PATTORNEY'S DOCKET NUMBER
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09 NEW 890690

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/00910	February 4, 2000	February 4, 1999
TITLE OF INVENTION COLORING CERAMICS BY WAY OR IONIC OR COMPLEX-CONTAINING SOLUTIONS		
APPLICANT(S) FOR DO/EO/US SUTTOR, Daniel; HAUPTMANN, Holger; SCHNAGL, Robert; FRANK, Sybille		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).</p> <p>4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). WO 00/46168 b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). </p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)) <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> is transmitted herewith. b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4) </p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)). <ul style="list-style-type: none"> a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. </p> <p>8. <input checked="" type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input checked="" type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>		
Items 11. to 20. below concern document(s) or information included:		
<p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98-International Search Report (PCT/ISA/210) w/ 9 documents</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: <ul style="list-style-type: none"> 1.) Certified copy of the translation of the International Application 2.) Zero (0) sheets of Formal Drawings </p>		

091890690

21. The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):**

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1,000.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO. \$860.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4). \$690.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4). \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =**CALCULATIONS PTO USE ONLY**

Surcharge of \$130.00 for furnishing the oath or declaration later than 20 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 130.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total Claims	17 - 20 =	0	X \$18.00
Independent Claims	2 - 3 =	0	X \$80.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		Yes	+ \$270.00

\$ 130.00	
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TOTAL OF ABOVE CALCULATIONS =

\$ 1260.00	
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Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.

\$ 0	
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SUBTOTAL =

\$ 1260.00	
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Processing fee of \$130.00 for furnishing the English translation later than 20 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +

\$ 0	
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TOTAL NATIONAL FEE =

\$ 1260.00	
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Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

\$ 0	
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TOTAL FEES ENCLOSED =

\$ 1260.00	
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Amount to be: refunded	\$
charged	\$

a. A check in the amount of \$ 1260.00 to cover the above fees is enclosed.

b. Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292

P.O. Box 747

Falls Church, VA 22040-0747

(703)205-8000

Date: August 3, 2001

By


Andrew D. Meikle, #32,868

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF TRANSLATION

Honourable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

I, CARLY EMMA MARY ROSE, BSc, Technical Translator, of c/o Priory Translations Limited, 11, Magdalen Street, Colchester, Essex, England, hereby state:

THAT I am well acquainted with the German and English languages.

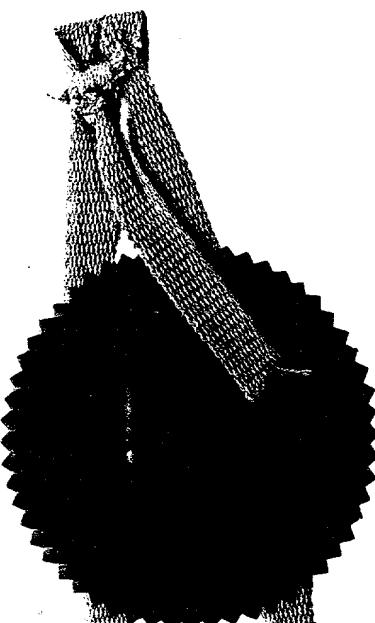
THAT I translated the document identified as PCT Patent Application No. PCT/EP00/00910 filed on 4th February 2000, plus amended claim, from German into English;

THAT the attached English translation is a true and correct translation of PCT Patent Application No. PCT/EP00/00910, plus amended claim,

to the best of my knowledge and belief; and

THAT all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true and further, that these statements are made with the knowledge that wilful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code


CARLY EMMA MARY ROSE



PATENT
0475-0192P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: SUTTOR, Daniel et al. Conf.:
Int'l. Appl. No.: PCT/EP00/00910
Appl. No.: New Group:
Filed: August 3, 2001 Examiner:
For: COLORING CERAMICS BY WAY OF IONIC OR COMPLEX-
CONTAINING SOLUTIONS

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION

Assistant Commissioner for Patents
Washington, DC 20231

August 3, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/EP00/00910 which has an International filing date of February 4, 2000, which designated the United States of America and was not published in English.--

IN THE CLAIMS:

Please amend the claims as follows:

5. (Amended) Process according to claim 3, characterized in that chlorides, acetates or alcohols as well as oxo complexes are used as salts.

6. (Amended) Process according to claim 1, characterized in that dental ceramics are used in the pre-sintered state.

7. Process according to claim 1, characterized in that dental ceramics based on zirconium oxide or aluminum oxide are used.

8. (Amended) Process according to claim 1, characterized in that the ionic or complex-containing solutions are water- or alcohol-based.

9. (Amended) Process according to claim 1, characterized in that the action time of the ionic or complex-containing solutions is a matter of hours, in particular under two hours, quite particularly under 1 hour and particularly preferably under 20 minutes.

10. (Amended) Process according to claim 1, characterized in that the concentration of the solutions is 0.001 to 15 wt -%.

11. (Amended) Process according to claim 1, characterized in that colouring takes place by immersion of the ceramic in the solutions, deposition of the solutions to the ceramic with the help of application instruments or by spraying of the solutions onto the ceramic.

12. (Amended) Process according to claim 1, characterized in that the ceramics to be coloured have a diameter of 10 mm, preferably 7 mm, and a height of 7 mm, preferably 5 mm.

13. (Amended) Process according to claim 1, characterized in that the ceramics are completely through-coloured.

REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application. The claims have also been amended to delete improper multiple dependencies and to place the application into better form for examination. Entry of the present amendment and favorable action on the above-identified application are earnestly solicited.

Attached hereto is a marked-up copy of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By


Andrew D. Meikle, #32,868

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Attachment: Version With Markings Showing Changes Made

(Rev. 01/22/01)

VERSION WITH MARKINGS SHOWING CHANGES MADE

The specification has been amended to provide cross-referencing to the International Application.

The claims have been amended as follows:

5. (Amended) Process according to claim 3 [or 4], characterized in that chlorides, acetates or alcohols as well as oxo complexes are used as salts.

6. (Amended) Process according to [at least one of claims 1 to 5]claim 1, characterized in that dental ceramics are used in the pre-sintered state.

7. Process according to [at least one of claims 1 to 6]claim 1, characterized in that dental ceramics based on zirconium oxide or aluminum oxide are used.

8. (Amended) Process according to [at least one of claims 1 to 7]claim 1, characterized in that the ionic or complex-containing solutions are water- or alcohol-based.

9. (Amended) Process according to [at least one of claims 1 to 8]claim 1, characterized in that the action time of the ionic or complex-containing solutions is a matter of hours, in particular under two hours, quite particularly under 1 hour and particularly preferably under 20 minutes.

10. (Amended) Process according to [at least one of claims [at least one of claims 1 to 9]claim 1, characterized in that the concentration of the solutions is 0.001 to 15 wt -%.

11. (Amended) Process according to [at least one of claims 1 to 10]claim 1, characterized in that colouring takes place by immersion of the ceramic in the solutions, deposition of the solutions to the ceramic with the help of application instruments or by spraying of the solutions onto the ceramic.

12. (Amended) Process according to [at least one of claims 1 to 11]claim 1, characterized in that the ceramics to be coloured have a diameter of 10 mm, preferably 7 mm, and a height of 7 mm, preferably 5 mm.

13. (Amended) Process according to [at least one of claims 1 to 12]claim 1, characterized in that the ceramics are completely through-coloured.

Colouring of ceramics by means of ionic or complex-containing solutions

5 The invention relates to the colouring of ceramics by means of ionic or complex-containing solutions. The invention relates in particular to the colouring of dental ceramics based on zirconium oxide by means of solutions of rare earth metals and subgroup elements.

10

Ceramics are much valued, because of their physical properties, in the construction of high-quality dentures. Aluminium and zirconium oxide ceramics have long been the materials of choice in the medical field (Reprint from Industrie Diamanten Rundschau, IDR 2/1993, "Aluminium- und Zirkonoxidkeramik in der Medizin"). There are a number of publications in the dental field which deal with the use of ceramics for the preparation of prostheses. Various ceramic systems are also already available on the dental market (CEREC, Fa. Siemens; Procera, Fa. Nobel-Biocare).

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25
30

In the dental field in particular, however, it is not only the mechanical parameters that play a major role, but also specially the aesthetics. Translucence and coloration of the framework or facing ceramics are important, in order to allow the patient to achieve a natural appearance for his dentures.

Dentures are normally prepared from a framework and a facing.

In the case of the systems known up until now, only a superficial individual colouring of the basic framework can be carried out by the dental technician, the aesthetic design possibilities being limited.

5

In order to achieve a natural appearance of the prosthesis, the tooth colour and the translucence must be simulated over several layers, beginning with the framework.

10 The natural appearance of a prosthesis is guaranteed by as high as possible a free path length $z = x + y + m$ of the incident light through the layer (x) of the facing ceramic and the layer (m) of the framework ceramic and optionally an intermediate layer (y).

15

In order to change the basic shade of the framework ceramic, conventional systems must work with colouring intermediate layers, for example opaquer liners, which display no, or greatly reduced, translucence; the free path

20 length of the light decreases by the thickness of the framework ceramic (m) and of the intermediate layer (y) to $z = x$. A description of this procedure can be found in e.g. the instructions issued by Vita for the use of the Vita-Dur system □ or by DUCERA for the ALL Ceram system.

25

Such systems use, as intermediate layer, dye pastes or dye suspensions, which are applied to the framework by the dental technician in several procedures and are finally fired in the oven.

30

This process is not only time-consuming, but also cost-intensive.

The object of the invention is thus to provide a system for the colouring of ceramics, in particular ceramic dentures, which guarantees an optimum aesthetic appeal with minimal 5 outlay on labour and with costs reduced to the minimum.

Surprisingly, this object is achieved by a process for the colouring of ceramics in the porous or absorbent state, which is characterized in that the ceramics are translucent 10 and metal ion solutions or metal complex solutions are used for the colouring. Solutions preferred for this contain defined concentrations of at least one of the salts or complexes of the rare earth elements or the elements of the subgroups.

15 The solutions are preferably water- or alcohol-based. Suitable salts or complexes are preferably those from the group of the rare earths or the 2nd or 8th subgroups, in particular Pr, Er, Fe, Co, Ni, Cu.

20 Salts or complexes with inorganic opposed ions such as e.g. Cl⁻, Br⁻, J⁻, SO₄²⁻, SO₃²⁻, NO₂⁻, NO₃⁻, ClO₄⁻, ONC⁻, SCN⁻, are preferred, which can also mean oxo complexes of acid or basic salts, but not double salts with an element of the 25 1st or 2nd main groups. Furthermore, salts or complexes with organic ions or ligands are preferred which contain 1 to 30 C atoms and from 1 to 10 heteroatoms, such as O, N, S. In detail, these are alkoxides or salts of organic acids. Preferred here among the alkoxides are the salts of 30 the C₁-C₁₀-alkanols, in particular the methoxides, ethoxides, n- and i-propoxides and n-, i-, sec. or tert.-butoxides. Among the salts of organic acids, those of

mono-, di- and tri- C_1-C_{20} -carboxylic acids are preferred, in particular formate, acetate, malate, maleate, maleinate, tartate, oxalate. Finally, the ligands are also taken to include complexing agents serving to stabilise the metal salts in their oxidation stage and in solution. These can be organic C_2-C_{20} molecules with up to 10 hetero atoms, O, N or S, including in particular EDTA and its salts, NTA, salicylic acid, phenols, 5-sulphosalicylic acid etc.

10 Aqueous or alcoholic solutions of Pr, Er, Fe, are preferred, for example as chlorides, acetates or alcoholates.

15 The ions or complexes are preferably used in concentrations of 0.0001 to 15 wt.-%, particularly preferably from 0.001 to 10 wt.-% and quite particularly preferably from 0.01 to 7 wt.-%.

20 By ceramics and dental ceramics are meant here all high-strength oxides of the elements of the main groups II, III and IV and the subgroups III and IV as well as their mixtures, in particular Al_2O_3 , ZrO_2 , both partly and also fully stabilised, MgO , TiO_2 and their mixtures. In particular, translucent ceramics are taken to be covered by 25 the term ceramics and dental ceramics.

30 Furthermore it is surprising that the depth of colour of the colouring is not dependent on the action time of the solution but only on its concentration. This is particularly advantageous, as the dental technician is not tied to action times accurate to within a few seconds, but can perform his work within certain tolerances for as long

as is desired with the solutions according to the invention. The action time of the solution can in theory be as long as desired. It depends only on other effects in the solution, for example pH-value changes or the release of ions, which can hinder the colouring process. The result is generally an action time, until the depth of colour of the colouring does not change, of a few hours. The action time is preferably under 2 hours, in particular under 1 hour and particularly preferably under 20 minutes.

10

Advantageously, the above mentioned intermediate layer (y) can be completely dispensed with thanks to the present invention, as the framework ceramic can already be individually coloured by the solutions according to the invention. An additional cost- and time-intensive step of the firing of the intermediate layer is therefore dispensed with. Only the free path length $z = x+y+m$ is available to the incident light, as the path is no longer interrupted by the intermediate light.

20

The solutions according to the invention can also contain, alongside the salts or complexes of the rare earth elements or the subgroup elements, stabilising agents, such as complexing agents, grinding auxiliaries as well as organic dye stuff pigments to facilitate the matching of the colour by the dental technician.

Complexing agents, such as ethylenediaminetetra acetic acid, are suitable as stabilising agents. Grinding auxiliaries are taken to include for example temporary binders and thixotropy agents, such as polyglycols,

polysaccharides, polyethylene glycols, polyvinyl alcohols, hydrogenated castor oils.

Due to the low concentrations of colouring ions or

5 complexes within the solutions according to the invention and the associated poor optical recognizability of the applied shade, organic pigments can also be added to facilitate the matching of colour by the dental technician. These additives are particularly helpful during the 10 application of the solutions to specific areas by means of application instruments. The additives are to be chosen so that they are destroyed without leaving any residue upon the firing of the prosthetic work.

15 The solutions according to the invention can be applied in the following ways to the pre-sintered or absorbent ceramics:

1. Immersion of the ceramic in solutions of defined 20 concentrations;
2. Deposition of the solutions to the ceramic by means of suitable application instruments, for example, brush, swab;
3. Deposition of the solutions to the ceramic by means of 25 spraying processes.

Wall thicknesses of up to 10 mm, preferably 7 mm, are thoroughly coloured by means of the process according to the invention. In particular in the dental field, 30 dimensions of 10 mm, preferably 7 mm, for the diameter of a workpiece and 7 mm, preferably 5 mm, for the height of a workpiece are possible in the preparation of crowns and

bridges. These mm values relate to the thicknesses of the colourable wall thickness of the dental workpieces.

Naturally, workpieces outside the limits given here are also contained in the scope of the invention.

5

The ceramics are preferably completely through-coloured.

The invention also relates to a kit, comprising

- (i) at least one stock bottle with a metal ion or metal complex solution for the colouring of the ceramics,
- (ii) a receptacle for the colouring, and
- (iii) optionally a screen.

The invention is explained in detail in the following by means of examples, without thereby limiting it.

**Concentration-dependent colouring of zirconium oxide
stabilised by 3 mol yttrium oxide**

20 For the preparation of the solutions, the corresponding amounts of colour reagent are dissolved in water. Ceramic bodies are steeped in this for 5 minutes and then dried and sintered. The specimens are then ground and polished for 25 the colorimetry. The following parameters form the basis of the colour determination:

30 Opacity value O: Measure of the transparency (0% is completely transparent, 100% is opaque),

L*-value: Brightness (100: complete reflection; 0; no reflection);

a*-value: Red-green shift (+a: red; -a: green);
b*-value: yellow-blue shift (+b: yellow; -b:
blue);

5 Measuring apparatus: Hunterlab LabScan Spectrocolorimeter;
Measurement method: Cielab (colour), opacity according to
ASTM D2805/TAPPI T425/TAPPI T519.

To demonstrate the independence of the colour intensity
10 from the action time of the solution, various action times
are used with a fixed solvent concentration and the colour
determination carried out analogously.

Commercial zirconium dioxide from Tosoh, Japan of the type
15 TZ3YE was used as material.

Colouring with Fe(III)Cl₃ solutions

Concentration solution [wt.-%]	L*	a*	b*	0
0	85.67	-0.97	1.51	91.4
0.1	83.93	-1.67	5.15	92.36
0.3	79.04	-1.52	22.35	95.1
0.5	75.37	1.16	25	95.32
0.75	74.01	1.72	25.91	96.51
1	72.25	2.83	24.67	97.79

Colouring with Pr(III) acetate solutions

Concentration solution [wt.-%]	L*	A*	b*	o
0.1	81.02	-3.60	24.98	89.98
0.25	80.80	-3.02	34.17	91.40
0.75	74.85	4.77	47.31	92.11

Result: The intensity of the colour can be controlled via
5 the concentration of the solution.

Dependency of colour intensity on action time

Solution concentration: 0.75 wt.-% Fe (III) Cl solution

Action time	L*	a*	b*	o
2 minutes	75.18	0.32	20.15	96.05
5 minutes	76.06	-0.42	21.4	95.86
10 minutes	75.18	-0.09	22.4	96.08
20 minutes	75.80	-0.21	23.11	96.37

Result: The action time has no effect on the colour intensity.

Patent claims

1. Process for the colouring of ceramics in porous or absorbent state, characterized in that the ceramics are translucent and metal ion solutions or metal complex solutions are used for the colouring.
5
2. Process according to claim 1, characterized in that dental ceramics are coloured.
10
3. Process according to claim 1 or 2, characterized in that the solutions contain at least one of the ions or complexes of the rare earth elements or subgroups.
15
4. Process according to claim 3, characterized in that the solutions contain Pr, Er, Fe, Co, Ni or Cu.
20
5. Process according to claim 3 or 4, characterized in that chlorides, acetates or alcohols as well as oxo complexes are used as salts.
25
6. Process according to at least one of claims 1 to 5, characterized in that dental ceramics are used in the pre-sintered state.
30
7. Process according to at least one of claims 1 to 6, characterized in that dental ceramics based on zirconium oxide or aluminium oxide are used.
35
8. Process according to at least one of claims 1 to 7, characterized in that the ionic or complex-containing solutions are water- or alcohol-based.
40

9. Process according to at least one of claims 1 to 8,
characterized in that the action time of the ionic or
complex-containing solutions is a matter of hours, in
particular under two hours, quite particularly under 1
hour and particularly preferably under 20 minutes.

5

10. Process according to at least one of claims 1 to 9,
characterized in that the concentration of the
solutions is 0.001 to 15 wt.-%.

10

15. Process according to at least one of claims 1 to 10,
characterized in that colouring takes place by
immersion of the ceramic in the solutions, deposition
of the solutions to the ceramic with the help of
application instruments or by spraying of the
solutions onto the ceramic.

15

20. Process according to at least one of claims 1 to 11,
characterized in that the ceramics to be coloured have
a diameter of 10 mm, preferably 7 mm, and a height of
7 mm, preferably 5 mm.

20

25. Process according to at least one of claims 1 to 12,
characterized in that the ceramics are completely
through-coloured.

25

14. Kit, comprising

30 (i) at least one stock bottle with a metal ion or
metal complex solution for the colouring of the
ceramics,

30 (ii) a receptacle for the colouring, and

(iii) optionally a screen.

Colouring of ceramics by means of ionic or complex-containing solutions

Abstract

5

The invention relates to the colouring of ceramics by means of ionic or complex-containing solutions. Solutions preferred for this contain defined concentrations of at least one of the salts or complexes of the rare earth elements or the elements of the subgroups. The invention also relates to a kit, which comprises at least one stock bottle with such a colouring solution, a receptacle for the colouring as well as optionally a screen.

BIRCH, STEWART, KOLASCH & BIRCH, LLP

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PLEASE NOTE:
 YOU MUST
 COMPLETE THE
 FOLLOWING

COMBINED DECLARATION AND POWER OF ATTORNEY
 FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

COLORING CERAMICS BY WAY OF IONIC OR COMPLEX-CONTAINING SOLUTIONS

the specification of which is attached hereto. If not attached hereto,
 the specification was filed on August 3, 2001 as
 United States Application Number _____;
 and amended on August 3, 2001 (if applicable) and/or
 the specification was filed on February 4, 2000 as PCT
 International Application Number PCT/EP00/00910; and was
 amended under PCT Article 19 on January 17, 2001 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56. I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
<u>199 04 522.4</u> (Number)	<u>Germany</u> (Country)	<u>February 4, 1999</u> (Month/Day/Year Filed)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

<u>(Application Number)</u>	<u>(Filing Date)</u>
_____ (Application Number)	_____ (Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Country	Application Number	Date of Filing (Month/Day/Year)
_____	_____	_____
_____	_____	_____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

<u>(Application Number)</u>	<u>(Filing Date)</u>	<u>(Status - patented, pending, abandoned)</u>
_____ (Application Number)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)

Insert Requested
 Information:
 (if appropriate)

Insert Prior U.S.
 Application(s):
 (if any)

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

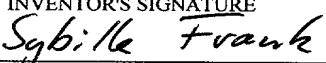
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PLEASE NOTE:
 YOU MUST
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 THE
 FOLLOWING:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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